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(54) Stage compartment structure for multistage pumps.

(57) The structure comprises a sleeve-like case member (11) fitting, at the opposite ends thereof, into a respective identical sleeve-like case member (11) and clamping thereagainst an annular partition member (12) extending perpendicularly to the pump driving shaft (4), a sealing ring (14) being provided for tight sealing the cases (11) and partition member (12).

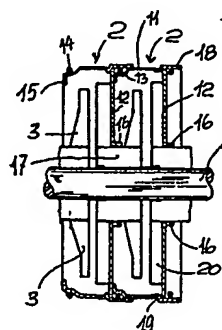


Fig.2

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This invention relates to a stage compartment structure for multistage pumps.

As is known, in order to achieve high heads with pumps of the centrifugal type, it is common practice to serially arrange a number of pump stages driven by a common motor. While such plural stages may have different characteristics and configurations, usually, in order to simplify their construction, identical stages are utilized the number whereof determines the head and flow rate characteristics.

However, the realization of the modular parts poses some technical problems, such as the seals between stages, the assembly capability of the structure, constructional and assembling simplicity, which are not always conveniently solved.

Thus the task of this invention is to provide a stage case for multistage pumps which can afford a reliable seal between stages, and is simple to manufacture and assemble.

This task is achieved, according to the invention, by a stage compartment structure for multistage pumps, characterized in that it comprises a sleeve-like case member surrounding in use the drive shaft of the pump and having one circumferentially recessed end portion, an opposite circumferentially enlarged end portion and an intermediate portion connecting that one and said opposite end portions, a circumferential shoulder materializing the

the connection between said intermediate sleeve portion and said opposite end portion, a partition plate member extending in use perpendicular to said drive shaft and having its peripheral edge portion in engagement with said shoulder, in use said opposite circumferentially enlarged portion of a preceding case member overlapping said one circumferentially recessed portion of a succeeding case member, sealing means being provided between the overlapping portions.

The main features of this invention will be more apparent from the following description of a preferred embodiment of the inventive stage case for multistage pumps, with reference to the accompanying illustrative drawing, where:

Figure 1 is a longitudinal section view of a multistage pump;

Figure 2 illustrates, in section, some pump stages, with the fitting and sealing areas in special evidence; and

Figure 3 illustrates, in enlarged scale, the longitudinal section through the upper wall of a case member.

With reference to the drawing figures, the numeral 1 designates the hydraulic portion of a multistage pump which comprises a plurality of stages 2, wherein corresponding centrifugal impellers 3 rotate, which are made rigid with one another through connection on a common axle or driving shaft 4, connected through a coupling 5 to a driving motor 6.

Said stages 2 are included between a suction or

intake head 7 and a delivery head 8 and held rigidly together by plural studs 9 with locking nuts 10 acting between the two heads 7 and 8.

Each stage 2 comprises substantially a cylindrical bell member formed laterally by a cylindrical container or case 11, with its generatrix arranged to generally extend parallel to the axis of the motor 4, and by a partition member 12 of annular shape, arranged to extend on a plane normal to said motor axis.

10 The case or container 11, which is preferably formed from pressed sheet metal, has at one end a recessed region 13, with a recess depth dimension selected to form an annular seat for a seal ring 14.

On the same side as said recessed region 13, said case 11 is closed by said partition member 12, and the recessed region is provided at the edge with a ring-like tooth 15, extending in a plane normal to said motor axis 4 adapted to abut against the partition member 12. The inside circumference of said partition member 12 is in turn provided with a bent tooth 16
20 constituting a rotation seat for the mouth 17 of the centrifugal impeller 3.

At the other end, the case 11 is provided with an outwardly offset or raised region 18, the offsetting dimension whereof is selected to be equal to the thickness of the sheet metal forming the case. The raised region 18 extends from a curved portion 19 constituting an abutment or shoulder for the outer circumference of the partition member 12.

30 Moreover, the stages 2 are provided, in a manner

known per se, with baffles 20.

During assembling, a preset number of cases 11, including their related partition members 12, are stacked together while inserting the impellers 3 as well. The cases, under the force exerted on the studs 9, provide a monolithic type of structure, wherein the hydraulic seal is achieved both mechanically through the tooth 15 and curved portion 19 abutting against the opposed faces of the partition member 12, and the raised region 18 engaging with the adjacent case, as well as elastically by means of the seal ring 14.

As may be seen, the construction is considerably simple, it only entailing the drawing of sheet metal and the optional grinding of the abutment surfaces.

Just as simple is the assembling procedure, to afford the realization of pumps in a wide range of heads by just changing the number of the basic modules.

Thus, the specified task has been advantageously achieved by providing a stage case for multistage pumps which is simple and economical.

In practicing the invention, the materials, shapes, and dimensions may be any ones suitable for the intended applications.

Furthermore, all of the details may be replaced with other technically equivalent ones.

CLAIMS

1 1. Stage compartment structure for multistage pumps,
2 characterized in that it comprises a sleeve-like case
3 member (11) surrounding in use the drive shaft (4) of the
4 pump and having one circumferentially recessed end
5 portion (13), an opposite circumferentially enlarged
6 end portion (18) and an intermediate portion
7 connecting that one (13) and said opposite (18) end
8 portions, a circumferential shoulder (19) materializing
9 the connection between said intermediate sleeve portion
10 and said opposite end portion (18), a partition plate
11 (12) member extending in use perpendicular to said
12 drive shaft (4) and having its peripheral edge portion
13 in engagement with said case member (19), in use said
14 opposite circumferentially enlarged portion (18) of a
15 preceding case member (11) overlapping said one circumferen-
16 tially recessed portion (13) of a succeeding case member
17 (11), sealing means (14) being provided between the
18 overlapping portions.

1 2. A stage compartment structure according to
2 claim 1, characterized in that said opposite circumferen-
3 tially enlarged portion overlaps in use also a portion
4 of said intermediate portion of the succeeding case
5 member and in fitting relationship therewith and wherein
6 between said opposite end portion (18) and said one
7 recessed end portion (13) of the succeeding case member
8 an interspace is defined containing said sealing means
9 (14) therein.

1 3. A structure according to claims 1 or 2, characterized
2 in that said partition plate member (12) is of disk-like
3 shape and wherein said one recessed end portion has an

4 edge in the form of a circumferential tooth (15)
5 bearing in use against said partition plate member (12)
6 thereby to fix said plate member (12) between said
7 circumferential shoulder (19) and said circumferential
8 tooth (15).

1 4. A stage compartment structure for multistage
2 pumps, substantially as herein described and
3 illustrated.

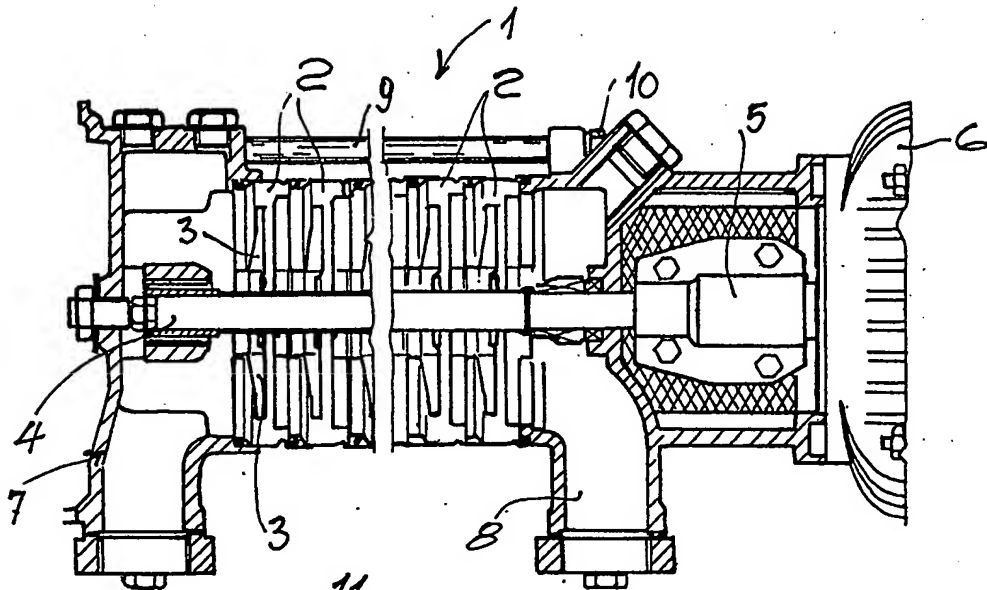


Fig. 1

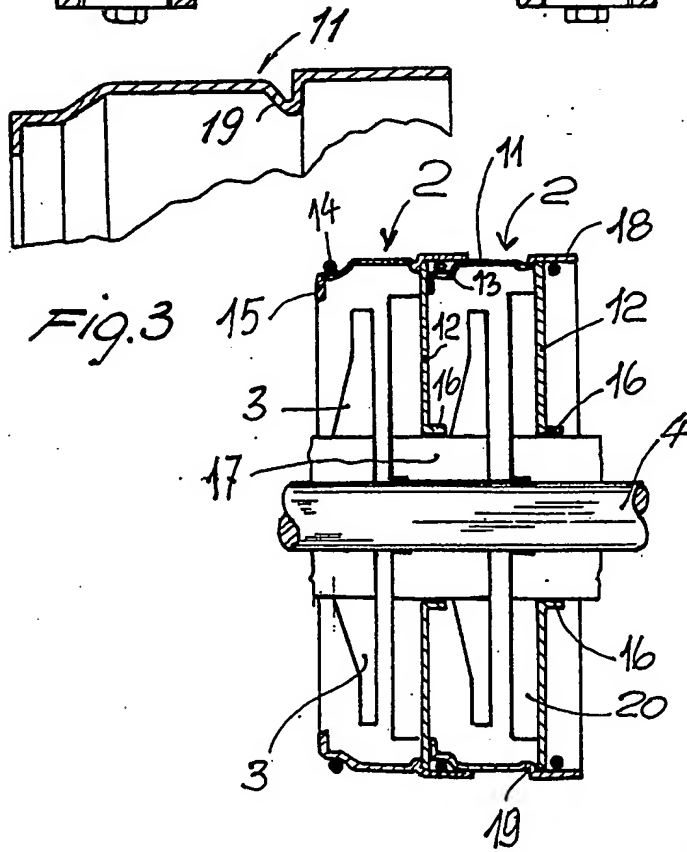


Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

0055426
Application number
EP 81 11 0541

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US - A - 1 366 589 (OSTENBERG) * The whole document * --	1	F 04 D 1/06 F 04 D 29/62
A	CH - A - 303 394 (WENGER) * The whole document * --	1,3	
A	DE - C - 353 978 (LEHMANN)		
A	FR - A - 2 349 753 (KSB) ----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			F 04 D
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons
			&: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 02-04-1982	Examiner DE SCHEPPER